PCL-849

4-Port RS-232
Interface Card

Copyright Notice

Acknowledgments

Contents

CHAPTER 1

Introduction

Description

The PCL-849 series are four port serial communication interface cards. Each port can be configured individually to RS-232 using on-board jumpers.

PCL-849A/849B serial ports are implemented using 16C554 UARTs which make serial I/O more reliable. For higher performance, 16654 UARTs can be installed in place of the 16C554 to create the PCL-849+. By buffering data into 64-byte packets before putting it on the bus, UARTs drastically reduce the CPU load. This makes the PCL-849+ especially suitable for high-speed serial I/O applications under multitasking environments and for applications involving high data rates.

PCL-849 series cards support two operating modes: standard mode and enhanced mode. In standard mode each of the four port addresses can be set individually. In enhanced mode, all four port addresses can be set automatically. The PCL-849+ also supports either shared IRQ or independent IRQ functions. When an on-board interrupt occurs the interrupt status register (vector address) indicates which port generated it. The shared interrupt can be set to most common (extended) AT interrupts. This simplifies programming, speeds interrupt processing and frees interrupts for other devices.

Each card comes with DOS drivers and PC-ComLIB, a serial communications library. PC-ComLIB supports most common languages, including C, Pascal, Visual Basic, assembly and Clipper. The PC-ComLIB package also includes the DataScope viewer, terminal emulator and self-diagnostics utilities for easy troubleshooting and debugging.

Features

- ❖ Four independent RS-232 serial ports

- ❖ Transmission speeds up to 921.6 Kbps

- ❖ Independent/Shared I/O addresses and IRQ settings for each of 4 serial ports

- ❖ Wide IRQ selection: 3, 4, 5, 6, 7, 9, 10, 11, 12, 15

- ❖ Supports Standard DOS COM1, COM2, COM3, and COM4

- ❖ Supports DOS/Windows 3.1 (PC-ComLib), Windows 95, Windows NT

- ❖ Supports surge protection: 2000 V_{DC} (PCL-849B/849+)

- ❖ PC-ComLib software included

- ❖ LED indicators on each port indicate data flow

- ❖ Compatible with standard PC ports: COM1, COM2, COM3, COM4

- ❖ On-board interrupt status register for greater throughput

- ❖ Complete RS-232 Modem-control signals

Specifications

- · Bus interface: ISA

- · Number of ports: 4

- · I/O address: 0x0200 ~ 0x03F8

- · IRQ: 3, 4, 5, 6, 7, 9, 10, 11, 12, 15

- · Data bits: 5, 6, 7, 8

- · Stop bits: 1, 1.5, 2

- · Parity: none, even, odd

- UART:

    4 × 16C554 (PCL-849A/849B)

    4 × 16C654 (PCL-849+)

- Speed (bps): 50 ~ 921.6K
- Connectors: 30-cm male DB-37 to 4 × DB25 male (DTE)
- Data signals: TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND
- Surge protection: 2000 V_{DC} (PCL-849B/849+)
- Power requirement: 250 mA typical 500 mA max. (+5 V),

    70 mA typical. 120 mA max.($\pm$12 V),

- Dimensions: 185 mm×98 mm
- Operating Temperature.: 0 ~ 60° C (refer to IEC-68-1.2.3 item)
- Storage Temperature: -25 ~ 80° C
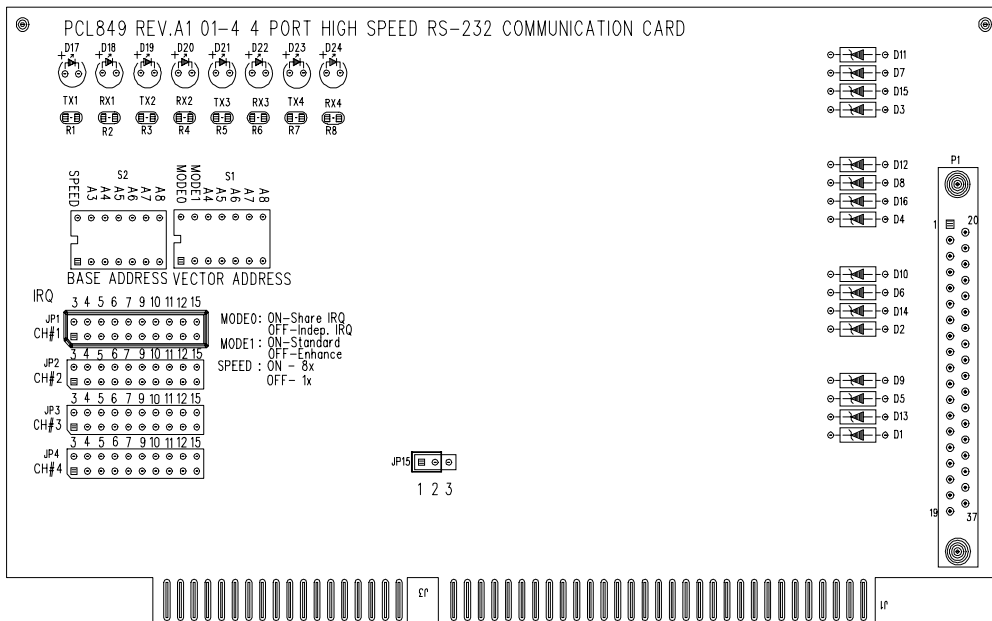- MTBF: over 135,000 hrs at 25° C, ground-fix environment

PCL849 REV.A1 01-4 4 PORT HIGH SPEED RS-232 COMMUNICATION CARD

Figure 1-1: Switch and jumper layout

Hardware Installation

Initial Inspection

Depending on the option you ordered, in addition to this manual, you should find the following items inside the shipping container:

- PCL-849(A/B/+) 4-port RS-232 Card

- One 30-cm male DB-37 to four male DB-25 cable

- One diskette with PCLS-802 PC-ComLIB software

- One PC-ComLIB user's manual

We have carefully inspected the PCL-849 mechanically and electrically before shipping. It should be free of marks and scratches and in perfect working order on receipt.

As you unpack the PCL-849, check it for signs of shipping damage (damaged box, scratches, dents, etc.). If it is damaged or it fails to meet specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection we will make arrangements to repair or replace the unit.

Remove the PCL-849 from its protective packaging by grasping the rear metal panel. Keep the anti-vibration packing. Whenever you remove the card from the PC, store it in this package for protection.

Warning! *Discharge your body's static electric charge by touching the back of the grounded chassis of the system unit (metal) before handling the board. You should avoid contact with materials that hold a static charge such as plastic, vinyl and styrofoam. Handle the board only by its edges to avoid static damage to its integrated circuits. Avoid touching the exposed circuit connectors.*

Card Installation

Warning! *Turn off your PC's power supply whenever you install or remove the PCL-849 or its cables. Static electricity can easily damage computer equipment. Ground yourself by touching the chassis of the computer (metal) before you touch any boards.*

1. Turn off the computer. Turn the power off to any peripheral devices (such as printers and monitors).

2. Disconnect the power cord and any other cables from the back of the computer. Turn the PC if necessary to gain access to the cables.

3. Remove the PC's cover (refer to your user's guide if necessary).

4. Locate the expansion slots or passive backplane (at the rear of the PC) and choose any unused slot.

5. Remove the screw that secures the expansion slot cover to the PC (save the screw to secure the interface card retaining bracket). Remove the anti-vibration card clamp if supplied.

6. Carefully grasp the upper edge of the PCL-849 card. Align the hole in the retaining bracket with the hole on top of the expansion slot. Align the gold striped edge connector with the expansion slot socket. Press the board firmly into the socket.

7. Replace the screw in the expansion slot retaining bracket. Replace anti-vibration card holder.

8. Replace the PC's cover. Connect the cables you removed in step 2.

9. Attach the DB-37 cable to the connector on the bracket. Turn the computer power on.

The board is now installed in the computer. See Chapter 3 for information on cabling.

Card Configuration

Each port on the PCL-849 card has a jumper and a DIP switch which require configuring prior to use. The DIP switch sets the port to the appropriate I/O address and speed mode. The jumpers set the port's IRQ.

Default Settings

The board is shipped with default settings. If you need to change these settings, however, see the following sections. Otherwise, you can simply install the card. Note that you will need to disable your CPU card's on-board COM ports, if any, or set them to alternate addresses / IRQs.

PCL-849 Default Configuration

Setting	Default function
JPI	IRQ 12
Speed mode	1x
IRQ mode	Share
Base address	Address 300H
Vector address	Interrupt 280H
Interrupt mode	Enhance

I/O Address and Interrupt Setup

Next, you will need to select an IRQ (interrupt request) number, and an I/O base address for the PCL-849.

Model Setup (base address setting)

The card base address can be set up using Mode 1. Please note that the DIP switch is for mode setting as shown below.

Standard Mode   Enhance Mode
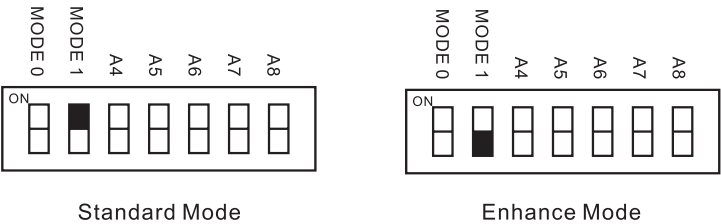
Standard Mode

In this mode, each of the four ports has been set up as an address, as shown below.

Port 1	Ch1	base address	3F8
Port 2	Ch2	base address	2F8
Port 3	Ch3	base address	3E8
Port 4	Ch4	base address	2E8

Enhanced Mode

In this mode, each of the four ports has been set up as an address individually. Select an address which is not already in use by another card in the system. If you are installing more than one PCL-849 card in your system, set the cards to different base adresses. DIP switches control each card's base address, as shown below.

Port base address (S1)						
Base Address	A_3	A_4	A_5	A_6	A_7	A_8
200-21F	●	●	●	●	●	●
208-227	○	●	●	●	●	●
. . . .						
2E8-307	○	●	○	○	○	●
. . . .						
*300-31F	●	●	●	●	●	○
. . . .						
3E0-3FF	●	●	○	○	○	○

●: on   ○ : off   *= default

Default Settings

Mode	Enhanced	Mode
Port 1	IRQ12	Address 300H
Port 2	IRQ12	Address 308H
Port 3	IRQ12	Address 310H
Port 4	IRQ12	Address 318H

The following example shows how to set the base address to 2F8.

The switch sum is set to 2F8: 200 + 80 + 40 + 20 + 10 + 8 (HEX).

Base Address Value	Decimal Value	Hex Value
A3	8	8
A4	16	10
A5	32	20
A6	64	40
A7	128	80
A8	256	100
A9*	512	200
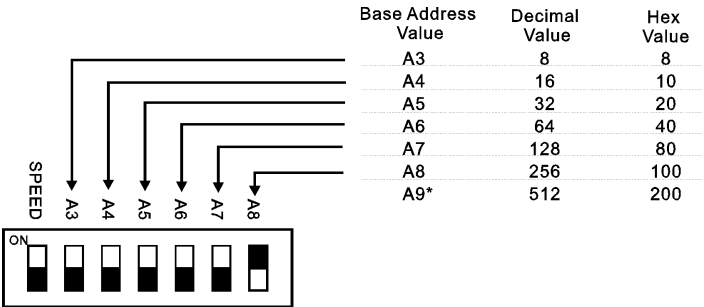
Note: On the PCL-849 address line A9 does not appear on the DIP switch, as it is permanently hardwired to hex 200.

Interrupt Level (IRQ) Setting (S1, JP1, JP2, JP3, JP4)

The card's IRQ can be set up using S1. Please note that the DIP switch is for setting the mode as shown below.
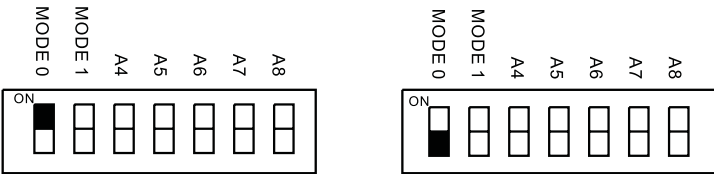
Shared IRQ Mode   Independent IRQ Mode

Independent IRQ Mode (JP1-JP4)

In this mode, each of the four ports can have IRQ channels set
individually. For each port, select an IRQ which is not already in use
by another card in the system. The map of jumpers and ports is
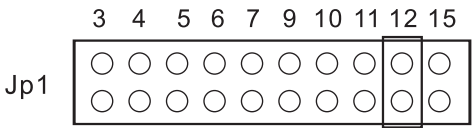shown below.

Port 1 → JP1

Port 2 → JP2

Port 3 → JP3

Port 4 → JP4

Share IRQ Mode (JP1)

Select an IRQ which is not already in use by another card in the
system. If you are installing more than one PCL-849, set them to
different IRQ numbers. Jumper Bank JP1 controls the card IRQ.
Simply place the jumper on the required interrupt level as shown in
the following figure.

Interrupt Status Register Setup (S1, Vector address)

This feature on the PCL-849 is utilized in the enhanced mode only.
When data arrives at one of the four ports, it will generate an interrupt
in the interrupt register. The PC software can read this, and identify
immediately which port generated the interrupt. This saves time, and
makes programming easier. When a data bit of the interrupt status
register is set to 0, the corresponding channel is selected to generate
an interrupt. If the bit is 1, then no interrupt is generated. DIP switch
S1 controls the card's interrupt status register, as shown in the follow-
ing figure and table.
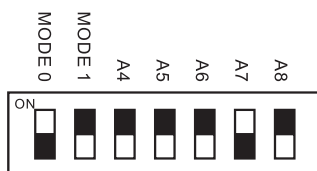
S1 280H (default)

Interrupt Status Register S1

Bit	Function
0	Port 1
1	Port 2
2	Port 3
3	Port 4
4	Not Used
5	Not Used
6	Not Used
7	Not Used

The user may change the interrupt status address via S1. Please note that the address decoder will occupy a continuous, 16-byte area related to the switch setting. For example, if you set the switch to 210H, then the address 210H to 21FH will all be decoded. The various DIP switch settings (S1) for the interrupt status register are as shown in the table opposite.

A4	A5	A6	A7	A8	Interrupt Register
ON	ON	ON	ON	ON	200H
OFF	ON	ON	ON	ON	210H
ON	OFF	ON	ON	ON	220H
OFF	OFF	ON	ON	ON	230H
ON	ON	OFF	ON	ON	240H
OFF	ON	OFF	ON	ON	250H
ON	OFF	OFF	ON	ON	260H
OFF	OFF	OFF	ON	ON	270H
ON	ON	ON	OFF	ON	280H
OFF	ON	ON	OFF	ON	290H
ON	OFF	ON	OFF	ON	2A0H
OFF	OFF	ON	OFF	ON	2B0H
ON	ON	OFF	OFF	ON	2C0H
OFF	ON	OFF	OFF	ON	2D0H
ON	OFF	OFF	OFF	ON	2E0H
OFF	OFF	OFF	OFF	ON	2F0H
ON	ON	ON	ON	OFF	300H
OFF	ON	ON	ON	OFF	310H
ON	OFF	ON	ON	OFF	320H
OFF	OFF	ON	ON	OFF	330H
ON	ON	OFF	ON	OFF	340H
OFF	ON	OFF	ON	OFF	350H
ON	OFF	OFF	ON	OFF	360H
OFF	OFF	OFF	ON	OFF	370H
ON	ON	ON	OFF	OFF	380H
OFF	ON	ON	OFF	OFF	390H
ON	OFF	ON	OFF	OFF	3A0H
OFF	OFF	ON	OFF	OFF	3B0H
ON	ON	OFF	OFF	OFF	3C0H
OFF	ON	OFF	OFF	OFF	3D0H
ON	OFF	OFF	OFF	OFF	3E0H
OFF	OFF	OFF	OFF	OFF	3F0H

Speed Mode selection

The PCL-849 employs a unique speed option that allows the user to choose either normal speed mode (1x) or high speed mode (8x). This high speed mode is selected at S2.
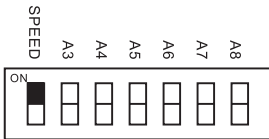
Normal Speed Mode

To select the band rate commonly associated with COM ports , such as 2400, 4800, 9600. . .115.2 Kbps, place the switch as follows.
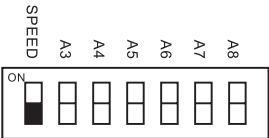
High Speed Mode

To increase normal mode rates up to eight times, (e.g. if 115.2 Kbps is selected, the rate can be increased up to 921.6 Kbps), place the switches as follows.
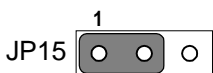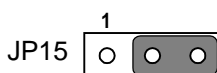
Software
Installation

Operating Environment Selection

Set jumper 15 (JP15) to correspond with your desired software operating environment. Connect the left two pins of JP15 to operate in DOS or Windows 3.1 mode, as shown below. Connect the right two pins to operate in Windows 95 or Windows NT mode .

DOS, Windows 3.1   Windows 95, Windows NT

Driver Installation for DOS Users

Make a duplicate copy of the driver diskette in case the original disk becomes lost or damaged. Copy the files to a subdirectory on your hard disk if you wish.

The PCL-849 comes with the PC-ComLIB software package. PC-ComLIB provides software drivers for DOS which supports most common languages, including C, PASCAL, Visual BASIC, Quick BASIC, Assembly and Clipper. PC-ComLIB also includes the DataScope data viewer, terminal emulator and self-diagnostics utilities for easy troubleshooting and debugging. Please see the PC-ComLIB manual for detailed information.

Card setup

The PCL-849's driver determines the configuration of the installed cards by reading a data file, GEN-DRV.CNF. When you first install the PCL-849, and each time you change the card's address and IRQ, you will need to run the card setup program to save the settings to the configuration file.

Program files should be installed to the hard disk. Insert the driver disk in your computer, type DOSINST from the A: (or B:) prompt and press enter. Once the files have been installed, type SETUP from the \COMLIB\BIN prompt and press ENTER. You will then see the screen on the following page.
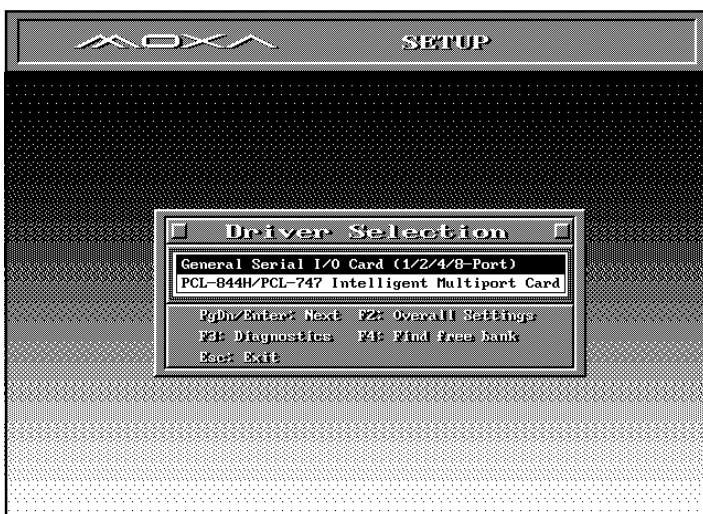
Driver selection screen

After the screen shows up, move the cursor bar (using the arrow keys or the mouse) to the general serial board field and press ENTER. The screen shown below will appear.

	General Serial I/O Card							
Port number	01	02	03	04	—	—	—	—
Base I/O address	180	188	190	198	—	—	—	—
Interrupt number	12	12	11	11	—	—	—	—
TxD buffer size	1K	1K	1K	1K	—	—	—	—
RxD buffer size	1K	1K	1K	1K	—	—	—	—
Baud rate	9600	9600	9600	9600	—	—	—	—
Character length	8	8	8	8	—	—	—	—
Stop bits	1	1	1	1	—	—	—	—
Parity	None	None	None	None	—	—	—	—
DTR output state	On	On	On	On	—	—	—	—
RTS output state	On	On	On	On	—	—	—	—
CTS flow control	No	No	No	No	—	—	—	—
RTS flow control	No	No	No	No	—	—	—	—
Tx XON/OFF cntrl	No	No	No	No	—	—	—	—
Rx XON/OFF cntrl	No	No	No	No	—	—	—	—

F1: Help   F2: Overall Settings F3: Add port   F4: Delete port
F5: Group edit F6: IRQ vector F8: Load config F10: Save Esc: Abort

Setup screen

Here you can set the configuration for each of the PCL-849 cards installed in the system. Set the IRQ, base address, baud rate, buffer size and port number to match the card's configuration. Do this by moving the highlight to the field you want to set up. Press ENTER and a menu will appear, allowing you to select the correct setting. The setup program also controls the port number assignments for each card. When you use a driver function in your program, you will identify the ports by these assignments. After you have set the IRQ, base address, baudrate, buffer size and port assignments, press F10 to save the settings or ESC to return to the previous page.

Note: Make sure that the base address and IRQ selected
          do not conflict with any other cards you may have
          installed in your system.

If any of your ports have the same setup, you can define them all at one time by pressing F5 to bring up the Group Setup screen shown below.

Group Edit menu

When you are finished setting up the ports, press the ESC key to return to the previous windows. Press F10 to save the new configuration or ESC to quit without saving. The setup program will then create a new configuration data file `GEN-DRV.CNF`.

DOS driver installation

You must install the PCL-849 card driver (GEN-DRV.EXE) before you run any application programs, including the DataScope utilities. If you are installing the driver for the first time, you will need to run the setup program (described in the previous section) to save the initial status of the PCL-849.

Because the driver is a TSR (Terminate and Stay Resident) program, you can execute it at any time – you do not have to install it in the CONFIG.SYS file.

To install the PCL-849 card driver change to the directory or floppy disk containing the driver files and type GEN-DRV. You should soon see the following message:

```
PC-ComLIB Serial Communication Driver (Ver x.xx)
Setup driver...

Device driver setup O.K.
```

If the driver can not detect any card or the GEN.DRV configuration file is not in the same directory as the driver, the following message will be displayed:

```
PC-ComLIB Serial Communication Driver (Ver x.xx)
Setup driver...

None serial port found!!
```

Driver removal

To remove the driver TSR program, just type GEN-DRV/q from the DOS prompt. The following message will appear:

```
PC-ComLIB Serial Communication Driver (Ver x.xx)
Release driver...

Device driver release O.K.
```

Programming

The following code fragment illustrates how the library functions can simplify card programming, reducing setup time and avoiding bugs. The following C program shows a simple data transfer test. It uses a PC-ComLIB function call to send data between Port 1 and Port 2 at a rate of 57.6 Kbps.

```c
/* Execute the PC-ComLIB TSR driver first*/
#include<head-c.h>
main()
{
  /*Setup PORT1 & PORT2 : baud = 57600 data = 8
  stop = 1 no parity*/
  sio_ioctl(1,B57600,BIT_8|P_NONE|STOP_1);
  sio_ioctl(2,B57600,BIT_8|P_NONE|STOP_1);

  /*Enable communication ports*/
  sio_open(1);
  sio_open(2);

  /*Transmit data on Port 1*/
  sio_write(1," Hello ",7);
  delay(200)

  /*Receive data on Port 2, store in buf1*/
  sio_1input(2,buf1,7,13);

  /*Print received data*/
  printf("%s\n",buf1);

  /*Disable communication ports*/
  sio_close(1);
  sio_close(2);
}
```

See the PC-ComLIB user's manual for information on programming and linking your application programs with the driver libraries.

Driver Installation for Windows 3.1 Users

Windows 3.1 provides a versatile and easily configurable interface that supports up to four COM ports with a standard driver. The PC-ComLIB Standard Windows COMM Driver, along with PCL-849, allow users to install up to six serial ports under Windows 3.1.

The Standard Windows COMM Driver supports Microsoft Windows COMM API (Application Programming Interface) such as Open-Comm(), ReadComm(), and WriteComm(). Application software like Windows Terminal program, LabVIEW, FIX, and pcANYWHERE for Windows, or other programs that support Windows COMM API calls can communicate to the outside world via PCL-849 multiport boards.

Installing the Standard Windows COMM Driver

1. Insert the PC-ComLIB diskette into the floppy drive A: (or B:).

2. In Windows File Manager, execute A:\WININST (or B:\WININST).

A **Driver Installation** window will appear.

Driver Installation window

3. Choose the board type, driver type, and the working directory to which the software will be copied when using PCL-849.

A maximum of 6 ports is supported if the existing standard COM ports (COM1 and COM2) are included. For example, you can set one serial port on the motherboard for COM1 (0x3F8, IRQ4), while designating COM2-5 on IRQ3 for the four ports on a PCL-849 card.

Note: *If using a serial mouse, it must be installed on either COM1 (0x3F8, IRQ4) or COM2 (0x2F8, IRQ3), and must have its own dedicated IRQ.*

The utility TTY, which can manipulate ports from COM1 to COM9, is included to help users monitor and debug RS-232 communications under Windows 3.x . It is a simple example program capable of sending and receiving data after each port is opened with selected communication parameters. As Windows 3.x features multitasking, multiple windows for the ports can appear simultaneously under TTY. However, Terminal, the application provided by Windows is limited for the use of COM1 to COM4.

After completing the installation, restart Windows. An additional line, "comm.drv=sercomm.drv", will appear for the PCL-849 in the [boot] section of the Windows SYSTEM.INI file. In addition, a Windows group "PC-ComLIB Standard COMM Driver" will be generated for reconfiguration, driver removal, etc. At this point, you are ready to execute applications that support Windows COMM API calls.

Installation for Windows 95 Environment

Windows 95 supports up to128 serial ports, from COM1 to COM128, in the Windows 95 environment. To fully integrate the advanced features of Windows 95, such as multi-processing and multi-threading, configure Windows 95 as described below:

1. Enter [**My Computer**], then [**Control Panel**], then [**Add New Hardware**].

2. Enter [**Next**], then choose [**N**]ot to do an auto search for new hardware.

3. Enter [**Next**], then choose [**Connection Port (COM & LPT**)] Hardware Type.

4. Enter [**Next**], then select [**Standard Connection Port Type**] for manufacturer and [**Communication Connection Port**] for model.

5. Enter [**Next**], then the default IRQ and I/O Addresses will be shown. Click [**Done**].

Up to this point you have added a port to the system without correcting IRQ and I/O settings. You can repeat step 1 to step 5 to add as many ports as you want (Max. 128 port).

6. Enter [**Control Panel**], then [**System**], then [**Device Manager**].

7. Select the newly added [**Communication port (COMn)**], where n is a new port number, then [**Resource**].

8. Select the ??? as [**Basic Configure 8**].

9. Double Click on IRQ and type in (**select**) the hardware IRQ, then [**OK**].

10. Double Click on I/O range and type in (**select**) the hardware I/O, then [**OK**].

Repeat steps 6 through 10 to setup each port correctly.

11. Click [**OK**].

12. Restart Windows 95 to initialize the new settings.

Installation for Windows NT Environment

Windows 95 supports up to256 serial ports, from COM1 to COM256, in the Windows NT environment. To fully integrate the advanced features of Windows 95, including multi-processing and multi-threading, configure Windows 95 as described below:

1. Enter **Control Panel** and choose **Ports** to add new COM ports.

2. Add new ports using the command sequence given in the following example. If you wanted to add the 4 new ports COM3 ~ COM6 listed below, you would add each port using the following command list: S2 ➔ 300h, JP1 ➔ IRQ7, MODE 0 ➔ Share IRQ Mode (DIP ON), MODE 1 ➔ Enhance Mode (DIP OFF). **Make sure no other devices use the same system resources.**

Port 1: Base Address **300h + 00h,**   **IRQ 5**

Port 2: Base Address **300h + 08h,**   **IRQ 5**

Port 3: Base Address **300h + 10h,**   **IRQ 5**

Port 4: Base Address **300h + 18h,**   **IRQ 5**

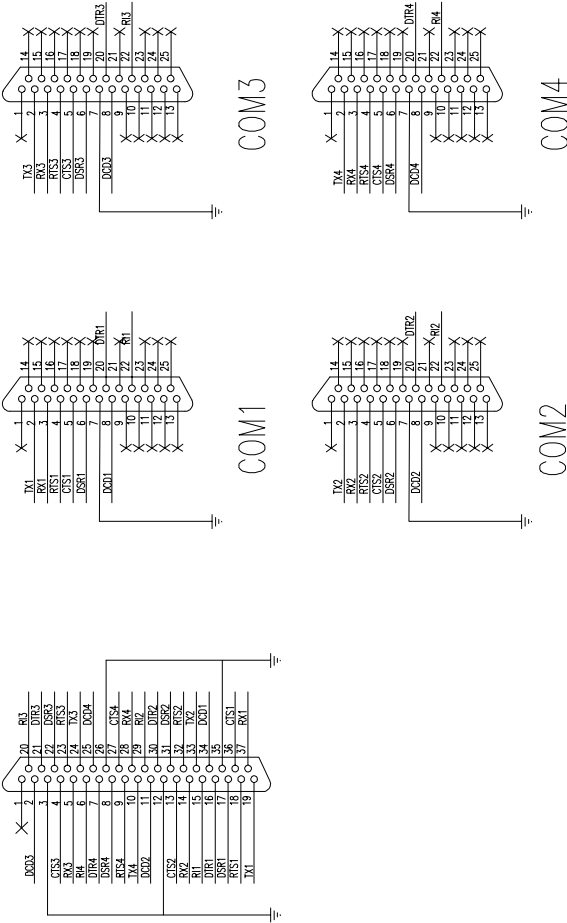Restart Windows NT to initialize the new settings.

Wiring

Connector Pin Assignments

The following diagrams show the pin assignments for DB-37 and DB-25 connectors for RS-232.

Four Port Connectors: DB-25

COM3

COM4

COM1

COM2

PCL-849: DB-37

PCL-849 Pin assignments for RS-232

Wiring

RS-232 signal wiring

Since the RS-232 interface is not strictly defined, many devices have their own connection methods which may ignore some signal lines or define reserved lines for other functions. It is best to refer to the user's manual for your device for installation instructions. You may find the following helpful.

In general, DTE (Data Terminal Equipment) refers to the device that is leading the communication. Examples include PC's, terminals and some printers. DCE refers to the device being communicated with or controlled. Examples include modems, DSU's (digital service units), printers and lab/factory equipment.

In some situations you may be able to get by with just three lines: data on TXD, a signal ground and a handshaking line. Examples are printer or plotter connections, troubleshooting and situations where you require only one-wire communication.

Terminal or PC (DTE) connections

DB-25 Male: PCL-849		DB-25 Male or Female: Terminal	
Pin	Signal	Pin	Signal
2	TxD	3	RxD
3	RxD	2	TxD
4	RTS	5	CTS
5	CTS	4	RTS
6	DSR	20	DTR
7	GND	7	GND
20	DTR	6	DSR
8	DCD	8	DCD

Modem connections

DB-25 Male: PCL-849		Modem (DCE)	
Pin	Signal	Pin	Signal
2	TxD	2	RxD
3	RxD	3	TxD
4	RTS	4	CTS
5	CTS	5	RTS
6	DSR	6	DTR
7	GND	7	GND
20	DTR	20	DSR
8	DCD	8	DCD

For DTE to DCE connection, use straight through cable, i.e. you don't have to reverse lines 2 and 3, lines 4 and 5, and lines 6 and 20. Because in general the DCE RS-232 interfaces are reversed themselves.

Terminal without handshake

DB-25 Male: PCL-849		Terminal, PC (DTE)	
Pin	Signal	Pin	Signal
2	TxD	3	RxD
3	RxD	2	TxD
4	RTS ⌐		
5	CTS ⌐		
7	GND	7	GND
6	DSR		
20	DTR		
8	DCD		

If not using CTS, RTS, DSR ,DTR signals, please loop back for the PC-ComLIB software to function correctly, because PC-ComLIB will always check for handshake signals.

PC I/O Address Reference

PC I/O Address Usage

The following table indicates the PC I/O address usage assignment. To prevent conflicting settings of the PCL-849 with other devices or I/O cards, you are recommended to refer this table.

I/O Address	Device
000 - 00F	DMA (8237A)
020 - 021	8259A IRQ Controller
040 - 043	8253/8254 Timer/Counter
060 - 063	PPI 8255A
070 - 071	Real-Time Clock
080 - 08F	DMA Page Register
0A0 - 0BF	8259A Interrupt Chip
0C0 - 0DF	Second DMA Controller 8237A
0F0 - 0FF	Math Coprocessor
1F0 - 1F8	AT Fixed Disk
200 - 20F	Game I/O
278 - 27F	Parallel Printer Adaptor #2
2F8 - 2FF	Serial Adaptor (COM 2)
320 - 32F	XT Fixed Disk
378 - 37F	Parallel Printer Adaptor #1
380 - 38F	SDLC Binary Communication Adaptor
3A0 - 3AF	Master Binary Communication Adaptor
3B0 - 3BF	Monochrome/Parallel Adaptor
3D0 - 3DF	Color Graphics Adaptor
3F0 - 3F7	Diskette Controller
3F8 - 3FF	Serial Adaptor (COM 1)

Quick Reference

> **Jumper Setting**

· **IRQ** Mode

DIP 1 (**MODE 0**) of **S1** is used to set the IRQ mode of this card.

DIP1 : **ON** (Upper) position   ➔   **Share IRQ** mode
DIP1 : **OFF** (Lower) position   ➔ **Independent IRQ** mode

· **STANDARD/ ENHANCED** Mode

DIP 2 (**MODE 1**) of **S1** is used to set the Standard/enhanced mode of this card.

DIP1 : **ON** (Upper) position   ➔ **STANDARD** mode
DIP1 : **OFF** (Lower) position   ➔ **ENHANCED** mode

· **STANDARD/ ENHANCED** Mode

DIP 1 (**SPEED**) of **S2** is used to decide the speed mode of this card.

> **Operating System Mode**

Connect the left two pins of **JP15** to use DOS, Windows 3.1

Connect the right two pins of **JP15** to use Windows 95, NT

> High Speed Mode (Frequency of Oscillator Crystal = 14.7456 MHz) ➔ Speed Bit on S2 is ON

DIP1 : **ON** (Upper) position   ➔ **High Speed Mode** or ´ **8 Mode** (Frequency of Oscillator Crystal = 14.7456 MHz)

DIP1 : **OFF** (Lower) position ➜ **Normal Speed Mode**

(Frequency of Oscillator Crystal = 1.8432 MHz)

STANDARD MODE: In this mode, The I/O Addresses and its IRQ Level for each port are set to default as shown below, (Disable BIOS setting of on-board COM1 ~ COM4)

Port No.	I/O Address	COM Port No.	IRQ Level (*)	
			Independent IRQ	Share IRQ
Port 1	3F8h	COM1	JP1	JP1
Port 2	2F8h	COM2	JP2	JP1
Port 3	3E8h	COM3	JP3	JP1
Port 4	2E8h	COM4	JP4	JP1

ENHANCED MODE: In this mode, The I/O Addresses and its IRQ Level for each port are set to default as shown below, (Make sure that the I/O address on BIOS setting of on-board COM1 ~ COM4 will never conflict with **[Base Address] ~ [Base Address + 20h])**

Port No.	I/O Address	COM Port No.	IRQ Level (*)	
			Independent IRQ	Share IRQ
Port 1	Base Address + 00h	COM1	JP1	JP1
Port 2	Base Address + 08h	COM2	JP2	JP1
Port 3	Base Address + 10h	COM3	JP3	JP1
Port 4	Base Address +18h	COM4	JP4	JP1